# Fortified Blended Foods

## Recipes

Facts and Practical Uses

WFP
World Food Programme





**This publication has been prepared by:**

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# 1. Background

## Introduction

Childhood malnutrition remains a major problem throughout the developing world and in emergencies. Malnutrition not only makes a child more prone to illness and death, it may also have debilitating mental and physical consequences that the child carries into adulthood.

One of the major factors contributing to child malnutrition is inappropriate feeding during the weaning period, i.e. the period from 6 months through 18-24 months, when a transition is made from a diet exclusively of breast milk to a child's partaking fully in the family pot. During this period, special foods are required to supplement and eventually replace breast milk. These foods (also called complementary foods) are often nutritionally inadequate, particularly lacking in micronutrients,[1] not easy to swallow or digest, and frequently contaminated. As a result, a child consuming them does not receive all the nutrients required for adequate growth or development.

## WFP and complementary foods

The World Food Programme's general food aid commodities (cereals, pulses and edible oils) can be part of a nutritionally suitable complement to breast milk. However, they are frequently in an inappropriate form for feeding older infants or young children and require extensive preparation and cooking time. Also, they need to be combined with other ingredients (e.g. fresh fruits and vegetables) to achieve sufficient levels of micronutrients.

To improve the value of food aid for older infants and young children, WFP distributes processed complementary foods that are also called fortified blended foods (FBFs). These are a mixture of cereals and other ingredients (e.g. soybeans, pulses, oilseeds, dried skim milk, and possibly sugar and/or vegetable oil) that has been milled, blended, pre-cooked by extrusion or roasting and fortified with a pre-mix of vitamins and minerals.

[1] Vitamins and minerals.

## Why fortified blended foods?

WFP has selected fortified blended foods as complementary foods for the food basket because they have various advantages over other alternatives:

- FBFs are good quality and comply with the "Guidelines on Formulated Supplementary Foods for Older Infants and Young Children" of the Codex Alimentarius (FAO/WHO).
- FBFs contain adequate calories (400/100 g)[2] and protein (15 g/100 g).[3]
- They are fortified with essential micronutrients (66 percent of the daily requirements of young children per 100 g). The fortification is extremely important since, in many situations, these micronutrients cannot be obtained from a normal diet.
- FBFs are pre-cooked and distributed as flour and therefore require only limited amounts of fuel for cooking.
- Their preparation does not require much time and is very easy.
- FBFs are easy for older infants and young children to swallow and digest and therefore are safe.
- They can be produced relatively inexpensively. The price per kcal/protein content is almost that of cereal flours and thus low compared with other micronutrient-rich commodities in the WFP basket.[4] The low cost of the foods maximizes coverage of the needy population and increases long-term sustainability.

## What kind of fortified blended foods does WFP distribute?

The bulk of the fortified blended foods distributed by WFP consists of in-kind donations from the United States of America. These comprise the original fortified blended foods, which were developed in the United States of America, namely, corn-soya blend (CSB) and wheat-soya blend (WSB). In addition to these donations, WFP's operations are further supported by purchases directly effected by the Programme. These purchases are made in the United States of America and Europe (e.g. WFP provided technical assistance to suppliers in the Netherlands and Belgium). However, WFP has also helped to build

[2] On dry matter basis.

[3] Cereals and pulses combined provide complete protein.

[4] The prices of FBF and cereal flours are around US$300/ton and US$220/ton, respectively.

national production capacities in developing countries, in collaboration with UNHCR and UNICEF. Local purchasing is being carried out in the Democratic People's Republic of Korea (with the blended food Koryo-mix), El Salvador, Eritrea (DMK), Ethiopia (Famix), India (Indiamix), Kenya (Unimix), Madagascar, Malawi (Lakuni Phala), Nepal (Unilitho), Nicaragua, Senegal and Uganda (see also page 54). All the FBFs distributed by WFP meet at least WFP product specifications (including nutritional composition requirements), and therefore can be used interchangeably without a problem in field operations. Efforts for further standardization are ongoing.

## How much fortified blended food does WFP distribute?

WFP's experience using FBFs to prevent and treat malnutrition among young children older than 6 months has been positive. As a result, the use of fortified blended foods has been encouraged, and over the last five years their distribution has doubled. Currently, WFP distributes approximately 160,000 mt of FBFs per year (55,000 mt purchased and 104,000 mt in in-kind donations). With FBFs' comparative advantages, WFP's policy is to continue to emphasize the importance of their inclusion in the rations for young children. The Programme will encourage their inclusion also in the rations of other vulnerable groups, such as expectant and nursing mothers, schoolchildren and the elderly, and will continue to support local production capacities.

The FBF ration size per beneficiary depends on the type of programme or beneficiary and the context. For populations totally dependent on food aid, it is sometimes recommended that 40-60 g of FBF be added to the general ration. In supplementary feeding programmes, the FBF ration size for children and expectant and nursing mothers is around 100-150 g for dry rations and 200-250 g for take-home rations. In school feeding programmes, an FBF drink (25-30 g) or porridge (100-150 g) can be prepared and distributed. For more information on FBF ration sizes, refer to WFP guidelines on nutrition.[5]

[5] Supplementary Feeding for Mothers and Children, 1998; School Feeding Handbook, WFP/UNHCR, 2000; Guidelines for Estimating Food and Nutrition Needs in Emergencies, 1997.

## Practical uses and preparation techniques for FBFs

Over the years, various countries have gained a wide experience with FBFs and have developed various preparation methods. Given the benefits of FBFs and the expected increase in their distribution, it was thought useful if these experiences were shared with WFP staff, counterparts and beneficiaries. It is hoped that this booklet will contribute to improving the utilization and acceptability of and appreciation for FBFs, will facilitate the introduction of fortified blended foods among new beneficiaries, and provide beneficiaries with possibilities for increasing variation in their diets.

The recipes are simple and require little preparation time and the addition of only a limited number of other foods. For each, the nutritional value of the FBF used is maintained. Some of the recipes indicate how they can be adapted to the requirements of different regions, cultural habits and the foods available.

This collection of recipes is only a beginning. It is expected that new recipes and experiences will be added over time. If you have recipes to add, comments or questions, please contact the Nutrition Unit in WFP Rome.

# 2. Food Safety and Fortified Blended Foods

As with any other foods, contamination of fortified blended foods can occur if care is not taken in their management and preparation. Contamination of food can cause illness, rather than bringing nutritional benefits.

Government authorities and WFP must ensure that fortified blended foods are fit for human consumption — at the time of their purchase, at their arrival and during their storage in warehouses in the beneficiary country. However, the fact that a food is deemed fit for human consumption does not necessarily mean that it will remain safe when stored or prepared under inadequate conditions. Knowledge of the minimal facilities necessary for safe storage and preparation are needed.

Sources of food contamination are diverse (see also the diagram on page 8). They include polluted water, flies, pests, domestic animals, unclean utensils or pots, unclean food handlers (e.g. soiled hands), dust and dirt. Raw foods themselves are frequently the source of contaminants, as some may naturally harbour pathogens.

Improper cooking and storage can promote the survival and/or growth of pathogens to levels that cause disease. Such practices include:

- preparation of food several hours prior to its consumption, combined with its storage at inadequate temperatures;
- insufficient cooking or re-heating of food;
- cross-contamination; and
- handling of food by people with poor personal hygiene (cooks may transfer pathogens they are carrying in or on their bodies to the food they are handling).

"The WHO Golden Rules for Safe Food Preparation" provides advice on how to reduce the risk of food-borne diseases. WHO recommends that these rules are adapted to different cultural settings.[6] Bearing

[6] Adapted from "The WHO Golden Rules for Safe Food Preparation", *Health Surveillance and Management Procedures for Food-handling Personnel.* Report of a WHO Consultation. World Health Organization, Geneva, 1989 (WHO Technical Report Series, No. 785)].

in mind the difficult conditions under which WFP-assisted programmes are implemented, the "simplified" list of rules below can be used as a guide during field visits and for making posters for distribution in health centres and at distribution points.

### 1. Are the FBFs thoroughly cooked?

Foods should be cooked thoroughly, until "piping" hot.

### 2. Are the cooked FBFs eaten immediately?

When cooked foods cool to room temperature, microbes begin to proliferate. The longer the wait, the greater the risk.

### 3. Are the cooked FBFs carefully stored?

Microbes thrive in cooked food kept at ambient temperatures and quickly proliferate to disease-causing levels. If food is prepared in advance, it has to be kept hot until served.

### 4. Are the cooked FBFs reheated thoroughly?

Microbes may develop during storage (proper storage slows down microbial growth but does not kill the organisms). Stored cooked foods should be reheated until "piping" hot.

### 5. Are the locally produced foods safe?

Fresh fruits and vegetables may be contaminated with disease-causing organisms, especially when untreated wastewater is used for irrigation or untreated nightsoil is used for fertilization.

### 6. Is contact between raw foods and cooked FBFs avoided?

Safely cooked food can become contaminated through even the slightest contact with raw food.

### 7. Do food handlers wash their hands?

The hands are one of the most important vehicles for the transfer of disease-causing organisms (from faeces, animals, raw foods, skin or other sites) to food. Food handlers should wash their hands thoroughly before preparing food and after every interruption.

## 8. Are kitchen surfaces and tools clean?

Foods are very easily contaminated. Food preparation premises and tools, and any surface used for food preparation, should be absolutely clean.

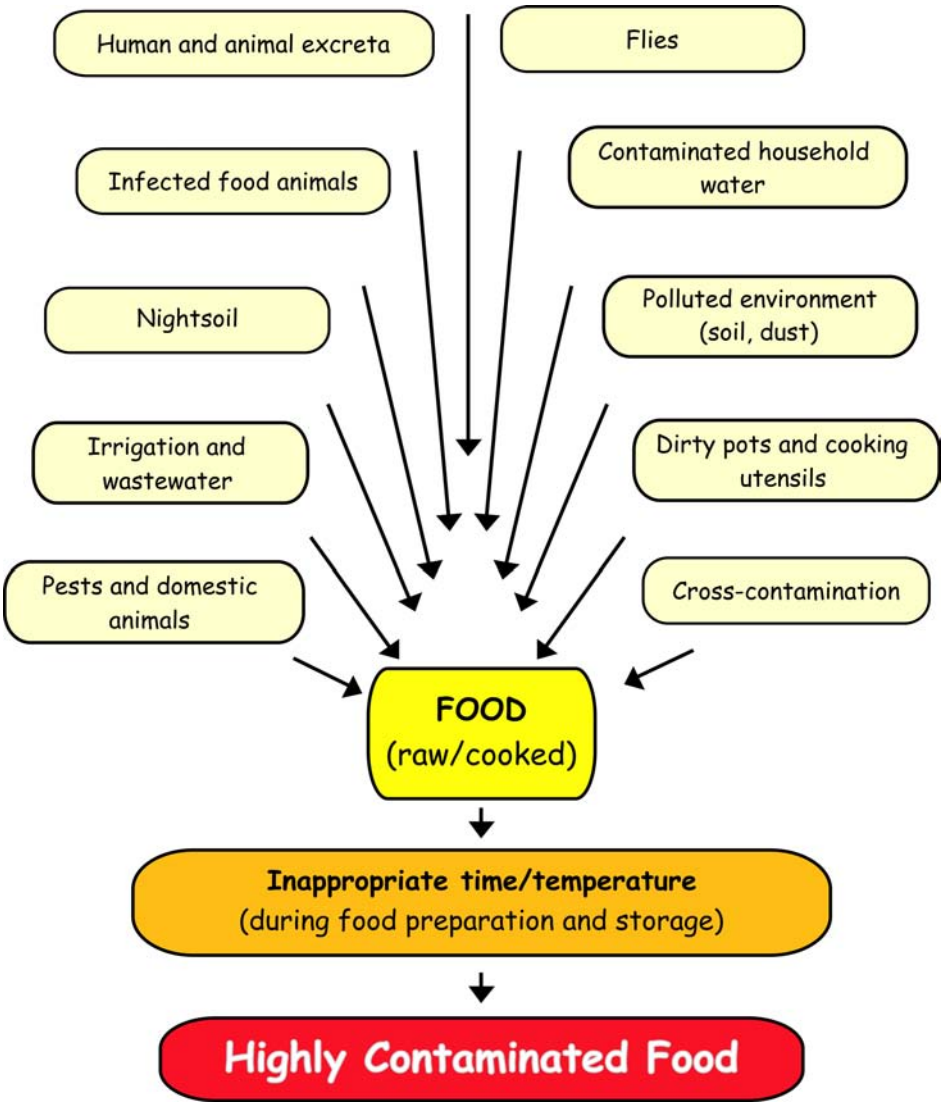
## 9. Are the foods protected from insects, rodents or other animals?

Animals frequently carry pathogenic micro-organisms. Foods should be covered or stored in closed containers.

## 10. Is safe water used?

Safe water is just as important for food preparation as it is for drinking. Water should always be boiled before it is added to food.

## Sources of contamination



# 3. Storage of Fortified Blended Foods

Fortified blended foods need to be handled and transported with care[7]:

- They should be bagged properly, i.e. during packaging as little air as possible should remain in the bags.
- They should be stored in a well-ventilated, cool, dry place.
- The storage place should be kept meticulously clean to prevent infestation by rodents and insects.
- FBFs need to be stored off the ground and stacked on a pallet made of wooden planks or bamboo to prevent condensation. They should be stored away from walls and roofs.
- There should be enough space left around the stacks for human passage, air circulation and inspection.
- The foods should be rebagged or used immediately if their bags are cut or torn.
- The principle of first-in, first-out should always be respected.
- The shelf-life of most FBFs is at least 6 months after the date of production. FBFs from the United States Agency for International Development (USAID) and Europe have a shelf-life of at least 12 months. If FBFs are stored beyond their date of expiry, loss of vitamins and minerals may occur. When there is doubt, the product should be sent for a quality check before its use.

[7] See also WFP Food Storage Manual.

# 4. Preparation and Use of Fortified Blended Foods

- Infants should be breastfed exclusively for the first 6 months. FBFs can be used as an acceptable food for complementary feeding (the addition of foods to the diet of a nursing child).

- FBFs are pre-cooked but **not** instant products; they are designed to be cooked/fried or baked for 2-15 minutes to complete their digestibility (cooking will also render the water used safe). Do not give unprepared FBFs to children under 5 or to malnourished patients.

- Ensure that the water used to prepare FBFs is of adequate quality and is boiled before being mixed with the FBFs.

- When mixing dry FBFs with water, be sure the pre-boiled water is cold, or lumps will form.

- The cooking time for FBFs may vary from 2 to 15 minutes, depending on the kind of preparation required.

- Stir FBFs continuously while they boil. Cook them until smooth.

- The thickness (and thus the energy density) of FBFs may be controlled, according to cultural preferences, depending on the amount of water added.

- Liquid remaining in the pan after the cooking of FBFs should be consumed, as it contains vitamins and minerals.

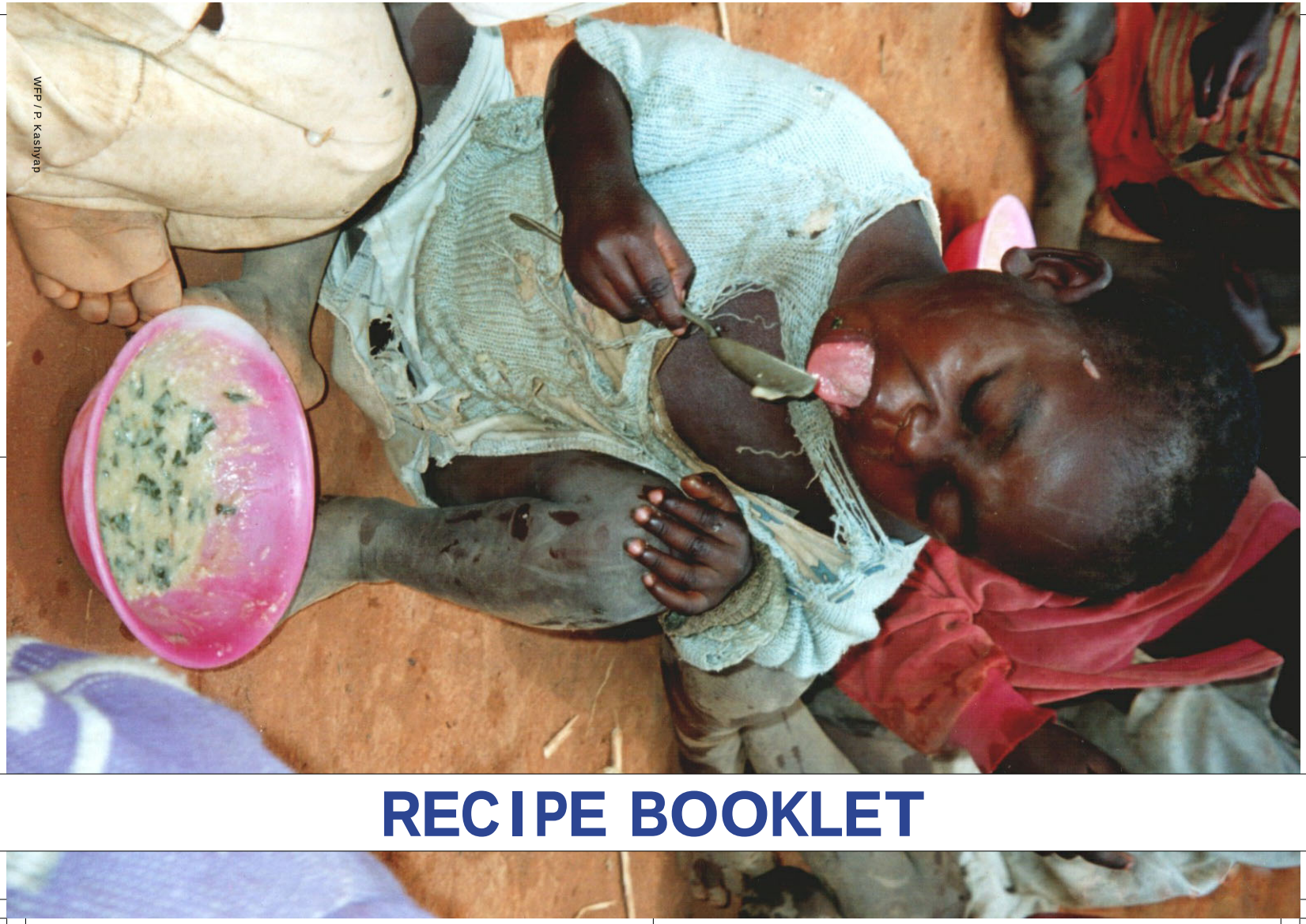
- To make a dough with FBFs, knead the flour with the desired quantity of water and set it aside for 10-15 minutes, until the dough has binding characteristics. FBFs produced with the extrusion process make slightly better dough than the those produced with the roasting process.

- To improve the taste (palatability) of the final product and to increase its nutritive value, add whatever local vegetables are available (washing them thoroughly beforehand).

- If possible, cultivate small gardens and use the vegetables for nutrition and health education, as a complementary strategy for the use of FBFs.

- In areas where fruits and vegetables are grown, they can be collected and dried and used with the FBFs to add nutritional value.

- To ensure the variety, acceptability and use of FBFs, use knowledge of the community and establish and share recipes.




# RECIPE BOOKLET

# 5. Index of Suggested Recipes

# Thin Porridge


WFP / A. Chicheri

**Ingredients**

1 part FBF
3 parts water
Sugar and salt to taste

**Method of preparation**

1. Mix FBF with small quantity of hot or cold water.
2. Stir the above mixture with remaining water and bring to a boil.
3. Leave porridge to simmer for another 5 to 10 minutes (stirring constantly).
4. Serve hot.

Various foods can be added while making the thin porridge:

- oil, to increase the energy density and taste
- leafy or other vegetables (savoury)
- seasonal fruits
- any local grains (such as soft fresh corn) or groundnuts

**Local names**

*Atmit* in Ethiopia
*Bouillie* in Senegal
*Bubur* in Indonesia
*Koko* in Ghana
*Phala* in Malawi
*Shooro* in Somalia/Ethiopia
*Thin porridge* or *Rab* in India
*Umusururu* in Burundi/United Republic of Tanzania

Particularly suitable for older infants (6-12 months)

# Thick Porridge


**Ingredients**

2 parts water

1 part FBF

**Method of preparation**

1. Boil water.
2. Add FBF and keep stirring to avoid lump formation.
3. Keep over a flame for 5 to 10 minutes, or until the porridge becomes stiff.
4. Serve hot, or allow to cool before serving.

**The following foods can be added to increase the dish's variety:**

- sugar or salt
- raw mangoes, tamarind or tomatoes
- leafy or other vegetables and salt
- seasonal fruits, and sugar if necessary
- any local grains (like soft fresh corn) or groundnuts
- mashed boiled sweet potato is added in the Democratic People's Republic of Korea and heated in oil (sweet potato blended food porridge or *Koguma Yongyang Juk*).
- yoghurt, tomato and carrot, to make vegetable yoghurt FBF porridge (*Namsae* Yoghurt *Yongyang Juk*).

**The flour can also be fermented beforehand, which will change the porridge's flavour.**

**Local names**

*Banku, Tuo Zafi* or *Kokonte* (fermented) in Ghana
*Besso* in Ethiopia
*Cereal Pap* in the Gambia (with FBF)
*Gunfo* in Somalia
*Juk* in the Democratic People's Republic of Korea
*Madida* in the Sudan and Southern Sudan
*Nsima* in Malawi
*Ubhugali* in Burundi
*Ugali* in the United Republic of Tanzania

Suitable for all age groups from 9-12 months onwards

# FBF Porridges with Fried Vegetables


WFP / F. Lemmens

## I Ingredients

1-2 potatoes, sliced
Oil
3-4 parts water
1 part FBF
1/4 part sugar
Salt
Sesame powder, sifted

## Method of preparation

1. Fry potato slices in oil.
2. Add water and FBF to cooked potatoes and boil for 10 minutes.
3. Add sugar, salt and sesame.
4. Continue boiling for another 5 minutes.

**Local names**
Potato FBF porridge
*Kamja Yongyang Juk* in the Democratic People's Republic of Korea

## II Ingredients

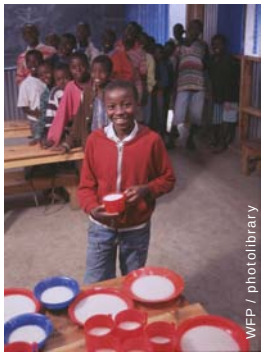
Thinly sliced ripe pumpkin (without skin)
Oil
1½ parts of water
Sesame powder
1 part FBF
Salt

## Method of preparation

1. Fry sliced pumpkin quickly in oil and then add water.
2. Boil mixture until pumpkin is dissolved.
3. Add sesame powder and FBF and boil for 10 minutes.
4. Add salt if needed.

**Local names**
Pumpkin FBF porridge
*Hopak Yongyang Juk* in the Democratic People's Republic of Korea

# Fortified Blended Food Drink




## Ingredients

1 part FBF
7-8 parts hot water
A little less than 1/2 part sugar
1/2 teaspoon salt (optional)

## Method of preparation

1. Mix FBF with small quantity of hot or cold water.
2. Stir FBF/water mixture into hot water and bring to a boil.
3. Stir frequently for 2-3 minutes.
4. Add sugar and salt while it cooks.
5. Serve hot or cold.

Additional ingredients, such as vanilla, cinnamon, cacao, and ginger can be added.

**Local names**

*Atole* in Guatemala
Beverage/drink in Ethiopia
*Camoca* in Cape Verde
*Horchata* in Latin America
Nutritious drink in Nepal
*Shurbad* in Somalia
*Soyatol* in Nicaragua (uses as much sugar as CSB, which is actually not recommended)

Suitable for children over 1 year.
The drink is often used in school feeding programmes.

# Roasted Blended Food Drinks

## I Ingredients

1 part FBF
A little less than 1/2 part sugar
Oil
7-8 parts hot water
1/2 teaspoon salt (optional)

### Method of preparation

1. Roast FBF and sugar for 5-10 minutes (with a little bit of oil, if available).
2. Mix roasted mixture with small quantity of hot or cold water.
3. Stir the FBF/water mixture into hot water and bring the mixture to boil.
4. Stir frequently for 2-3 minutes.
5. Serve hot or cold.
6. Additional ingredients can be added.


WFP / P. Kashyap

**Local names**
*Camoca* in Cape Verde

## II Ingredients

1 part FBF
Salt or sugar
Ghee

### Method of preparation

1. Roast FBF in ghee until it becomes light brown. (Ghee is not necessary. If unavailable, another oil can be used.)
2. Remove from fire and add salt or sugar.
3. Store in a dry jar.

Roasted blended food drinks can be stored for a week or two. They can be consumed with soup, milk or water.

**Local names**
*Sattu* in Nepal

Suitable for children over 1 year.

# Soups

## I Ingredients

1 part FBF
6-8 parts water
20 ml oil
2 tomatoes, chopped
1 onion, chopped
1/2-1 tablespoon salt

## Method of preparation

1. Add the FBF to the water and mix well to prevent lump formation.
2. Heat oil in a pan.
3. Add chopped tomatoes, onions and salt. Mix well and cook for 5 minutes.
4. Add the FBF/water mixture and boil for about 10 minutes over a very low flame.
5. Stir continuously to prevent lump formation.
6. Serve hot.

Green vegetables or other fresh/dried vegetables and beans can be added to the soup. If available, meat or fish can be added.
Note: for small children, the meat should be minced and boneless.

**Local names**

*Aprapransa* in Ghana (made with red palm nuts)
*India Viejo masa de Cazuela con CSB* in Guatemala
Soup in Cape Verde, India, Nicaragua and other countries

Suitable for all ages from 6 months onwards

# Soups

## II Ingredients

Ghee/oil
*Jwano* (spices)
1 part FBF
Water
Salt, to taste

## Method of preparation

1. Heat ghee/oil in a deep pan.
2. Add *jwano* and then the FBF.
3. Fry mixture until it browns.
4. Add four cups of water and stir constantly.
5. Add salt and boil the mixture for 5 minutes.
6. Serve hot.


Suitable for all ages from 6 months onwards

# Unleavened Bread


**Ingredients**

4 parts FBF (preferably wheat based; maize does not bind well and must be patted into shape rather than rolled)
2 parts warm water (enough to make dough)
4 tablespoons oil, melted butter or another type of fat
2 teaspoons salt

**Method of preparation**

1. Mix ingredients together into a dough and allow it to sit for 15-20 minutes.
2. Turn it onto a floured cloth or board and knead it thoroughly (unless kneaded well, with warm water, the dough will break easily).
3. Form into small portions.
4. Flatten portions by hand or roll with a rolling pin into round shapes.
5. Bake on a hot dry griddle or fry in a skillet with oil or fat (if available).

## Variations on preparation

- Sweeten dough with sugar (for example, *roti*, prepared in Nepal, are mostly made with sugar added to the dough).
- Add finely chopped green leafy vegetables or spices (red and green chillies, ginger, etc.) to the dough.
- Cook in a *tandoor* (wood-fired cylindrical clay hearth, with a side hole near the bottom for air).
- Instead of roasting, dough may be shallow fried or even deep fried.
- Dough may also be steam cooked. To do this, boil water in an ordinary vessel with a white cloth fastened over the mouth of the vessel. Place the small, flattened pieces of dough on the cloth. Cover the vessel with another vessel. The pieces of dough will steam cook.

**Local names of similar products**

*Ayap/Pam Pam* in Southern Sudan
*Burr* in Ethiopia, Somalia
*Drabeel, Karapeech* or *Youkeh* in Middle East/North Africa
*Moofa* in Somalia, Mogadishu (made in tandoor)
*Naan* in Bangladesh, India (made in tandoor), Pakistan
*Paratha* in Afghanistan, Bangladesh, India, Pakistan (shallow fried with oil on both sides)
*Poori* in Bangladesh, India, Pakistan (deep fried)
*Roti* or *Chapati* in Afghanistan, Bangladesh, India, Nepal, Pakistan, Yemen
*Savayat* in Somalia (shallow fried)

Suitable for all age groups over 1 year

# Pancakes

## Ingredients

1 part FBF (preferably wheat based)
1 teaspoon salt (optional)
Sufficient warm water to make a batter

## Method of preparation

1. Mix FBF and salt. Add water (slowly, to prevent lump formation) to make a batter of flowing consistency.
2. Leave in the sun for one hour or near the heat of the fireplace.
3. Oil skillet and place on the fire.
4. Pour flour mixture (batter) onto hot skillet, spreading it thinly and evenly.
5. When pancake begins to cook, loosen the edges from skillet.
6. Turn pancake and brown other side.

## Variations on preparation

- Add sugar to the batter.
- Add chopped leafy vegetables to the batter.
- After pouring the batter onto the skillet, cover the skillet with a lid to allow steaming and cook the pancake on one side at a time.

### Local names

*Enjira* in Ethiopia
*Kamja Jijim* in the Democratic People's Republic of Korea (includes grated potato and 1/2 part sugar)
*Kisera* in the Sudan
*Koguma Jijim* in the Democratic People's Republic of Korea (batter of maize-based FBF includes boiled sweet potato and 1 part wheat flour)
*Lahoh* in Somalia
*Uttapam* or *pooda* in India

Suitable for all age groups over 1 year

# Tortilla


**Ingredients**

4 parts FBF (preferably maize based)
1 1/2 parts water
1/2 tablespoon oil
2 teaspoons salt

**Method of preparation**

1. Mix ingredients together into a dough.
2. Divide the dough into 20-30-g pieces.
3. Allow the pieces to sit for 10-15 minutes.
4. Roll and press pieces into disks of 12-15 cm in diameter. Thickness of disks may vary from 0.2 to 0.5 cm.
5. Bake on a hot griddle or dry plate.
6. When tortilla puffs up, turn it and bake for 15-20 minutes.

# FBF Roasted Dough

**Ingredients**

2 parts FBF
3/4 part sugar
1 1/2 part warm water (pre-boiled)


**Method of preparation**

1. Warm a pan on a fire and add FBF.
2. Roast over slow fire until brown, continuing to stir it to prevent it from burning.
3. Add sugar and mix well.
4. In separate pot, boil water.
5. Slowly add boiling water to FBF, stirring constantly. The quantity of water added can be varied depending on preferred consistency (thick and sticky or more fluid).
6. Stir for another 2 to 3 minutes, remove from the fire and serve.

**Local names**

*Haluwa* in Nepal (roasted in oil)
*Halwa* in India

## Other preparation (which can be stored)

### Ingredients

2 parts FBF
3/4 part molasses

### Method of preparation

1. Roast FBF on slow fire until brown, continuing to stir it to prevent it from burning.
2. In a separate pan, heat molasses until sticky.
3. Add molasses to roasted FBF.
4. Mix thoroughly, bind the mixture tightly and shape it into a ball, the size of a lemon.
5. Can be stored for about two weeks.

**Local names**

*Kasar* in Nepal

Suitable for all age groups over 1 year

# Burfi


## Ingredients

2 parts FBF
3/4 part sugar
1 1/2 part warm water (pre-boiled)

## Method of preparation

1. Roast FBF over slow fire, stirring it continuously to prevent it from burning.
2. Add sugar and mix well. Remove from fire.
3. To the roasted FBF add the water, but slowly, to prevent lump formation.
4. Place mixture over slow flame until the water is entirely absorbed by the roasted flour.
5. Pour the entire mixture onto a flat plate or the lid of a pan.
6. Spread the mixture out evenly. If necessary, pat it with fingers that have been dipped in cold water (to prevent mixture from sticking to fingers).
7. When cool and firm, take a knife and cut into small pieces and serve.

**Local names**

*Burfi* in India and Nepal

# Roasted Fortified Blended Food (sweet)


## Ingredients

2 parts FBF
3/4 parts sugar/molasses

## Method of preparation

1. Warm pan over fire.
2. Add FBF and roast over a slow fire, stirring it continuously to prevent it from burning.
3. Add sugar or molasses and mix well.
4. Remove from fire. Serve cooled.

If they are available, the roasting may be done with ghee or oil, which makes the product even more delicious and calorie dense.

**Local names**

*Camoca* in Cape Verde
*Ikawa* or *Akawa* in Burundi/United Republic of Tanzania (sugar is added afterwards)
*Kasar* in Nepal
*Panjiri* or *Kasar* in India

Suitable for children over 3 years

# Fortified Blended Food Cake (baked)

## Ingredients

2 parts FBF
1 part sugar
20 g or 1 large tablespoon oil
1 1/2 teaspoon baking powder
Pinch of salt
3 parts water (enough to make a batter of flowing consistency)

## Method of preparation

1. Mix FBF with sugar, oil and salt. Mix in warm water until batter is of flowing consistency.
2. Allow to stand for up to 30 minutes in a warm place (near the fire or in a sunny spot).
3. In a pan, heat sugar over a fire, allowing it to caramelize.
4. Spread caramelized sugar evenly at the base of the pan and pour batter over sugar.
5. Bake in traditional way over a moderate flame for approximately 45 minutes.
6. Cool before serving.

## Additional ingredients

- ripe bananas
- leafy or other vegetables with salt
- any local seasonal fresh or dried fruits

**Local names**
*Cake* in India, Nepal, Somalia
*Chikondamoyo* in Malawi
*Kabalagala* in the United Republic of Tanzania
*Ofam* in Ghana
*Vidia* in Burundi


WFP / E. Espaillat

Suitable for all age groups over 1 year

# Fermented Steamed Cake


## Ingredients

1 part FBF
2/3 parts yoghurt or sour buttermilk
1 teaspoon salt
1/4 teaspoon cumin seed

## Method of preparation

1. Prepare a thick batter of FBF and yoghurt or sour buttermilk.
2. Add salt and cumin seed and mix well.
3. Cover and set aside overnight, or for 4-5 hours, in a warm place for fermentation.
4. After fermentation, stir batter well and pour into a flat pan. Steam cook it for 20 minutes.
5. Let it cool and then remove from pan.
6. Cut in small pieces and serve.

**Local names**

*Kaman* or *Dhokla* in India

# Fritters

**Ingredients**

1 part FBF
1 teaspoon salt
2/3 parts water
Fat or oil for frying


**Method of preparation**

1. Mix FBF with salt. Add water to make dough.
2. Heat the fat or oil in a frying pan.
3. Drop small balls of dough into the heated oil.
4. Fry 2 or 3 minutes until balls are golden brown.
5. Remove from fat and drain.
6. Serve hot.

**Variations on preparation**

- Add finely chopped vegetables, such as onions, potatoes and green leafy vegetables, and flavours and spices.
- Add sugar to make *beignets* (doughnuts).

**Local names**

*Beignets* in Senegal (sweet)
*Pakoda* in India (savoury)
*Tortas de CSB* in Guatemala (with finely chopped fried vegetables added)

# Mathi


**Ingredients**

1 part oil
3 parts FBF
1 part water
Oil for frying
Salt, to taste

**Method of preparation**

1. Cut oil/shortening into flour thoroughly.
2. Add water and knead mixture into hard dough.
3. Let sit for 10-15 minutes.
4. Roll 50 g of dough into rounds of 6-7 mm.
5. Prick rounds with a fork so that they do not puff during frying.
6. Fry to light brown color.
7. Remove from fat and drain.
8. Serve.

Suitable for all age groups over 6 months

# Samosas


**Ingredients**

Vegetable/condiments that are available
4 parts FBF
Salt, to taste
Oil, for frying
1 1/2-2 parts water
1 part oil/fat

**Method of preparation**

1. Boil vegetables.
2. Mix FBF, salt and oil.
3. Add water and knead mixture into hard dough.
4. Cover dough with wet cloth and let rest for 15 minutes.
5. Divide dough into 40 g pieces and roll the pieces into round shapes.
6. Cut shapes into semi-circles.
7. Place spoonfuls of boiled vegetables in the middle of semi-circles of dough.
8. Fold the edges of the dough up (i.e. into a triangular shape) and seal the edges.
9. Fry the samosas in oil to a golden colour.
10. Remove from fat and drain.
11. Serve.

Suitable for all age groups over 6 months

# Sweet Balls


**Ingredients**

2 parts FBF
1 part sugar
1/3 part warm water (pre-boiled)

**Method of preparation**

1. Roast FBF in a dry pan until its colour changes to light brown. Stir well to prevent it from burning.
2. Add sugar and mix well.
3. Remove from fire.
4. Sprinkle the water on the flour and mix well.
5. While mixture is still warm, roll small parts by hand into firm round balls.
6. Set aside and serve when cooled.

Suitable for all age groups over 1 year

# Steamed Rolls/Dumplings

## Ingredients

1 part FBF
1 medium onion (optional)
1/2 part water (enough to make a stiff dough)
1 teaspoon salt

## Method of preparation

1. Mix FBF with salt. Add water to make dough.
2. Form dough into small balls or rolls, and set aside.
3. Bring a pot of water to boil. Drop the rolls/balls into the boiling water.
4. Allow to cook and serve hot.

## Variations on preparation

- Set dough aside for 2-3 days to ferment. Wrap fermented dough in corn husks. Place in boiling water and cook untill done. (This version is known as *Kinke* in Ghana.)
- Add yeast to the dough and ferment for 30 minutes. Cut fermented dough into small pieces and sheeted. Place filling on pieces of dough and fold up edges. Steam for about 6 minutes (*Chinese dumpling*).

**Local names**

*Chinese dumplings* in China
*Gatte* in India
*Kinke* in Ghana (when fermented flour is used)

WFP / Jim Holmes

# Banana Leaf Rolls


WFP / P. Kashyap

## Ingredients

1 part water (sufficient to make a dough)
2 parts FBF
Banana leaves
Water for boiling

## Method of preparation

1. Add water to FBF to make dough.
2. Form dough into small balls and shape into circles or ovals, as desired.
3. Split fresh green banana leaf in half at the central rib.
4. Place dough in centre of leaf piece and fold leaf over dough. Tie with banana fibre.
5. Place twigs in the bottom of a pot. Add water to twig level.
6. Place the banana leaf rolls onto the twigs.
7. Cover pot and bring water to a boil, steaming rolls for about 30 minutes.
8. Remove banana leaf and serve cooked dough when cooled.

## Variations on preparation

- Sweeten with sugar or fruit pulp.
- Add vegetables.
- Instead of steaming the filled banana leaves, roast them directly on charcoal. When cooked, the dough will spread to the sides of the banana leaf and will be easily removed.

**Local names**

*Abodo* in Ghana (when roasted)
*Edibienkyewom* in Ghana (when steamed)
*Loe* in the United Republic of Tanzania
*Mkate* in Malawi

Suitable for all age groups over 1 year

# Cookies


## Ingredients

3/4 part oil
3/4 part sugar
2 parts FBF
1 teaspoon baking powder
1/4 teaspoon salt
1 teaspoon vanilla essence (optional)


## Method of preparation

1. Mix oil and sugar in a large bowl.
2. Add rest of ingredients and mix well into dough.
3. Drop dough from teaspoon onto a greased baking pan.
4. Bake using traditional methods at moderate heat for about 15 minutes until the cookies are cooked on the inside and lightly brown on the outside.

**Local names**

*Gallestas de CSB* in Guatemala (with water added)
*Incaparina* biscuits in Nicaragua (with water added)

Suitable for all age groups over 6 months

# Couscous


**Ingredients**
1 part FBF
Water
1 teaspoon salt

**Method of preparation**
1. Mix FBF with salt.
2 Add small amounts of water, cutting it into FSB until the texture is fine and granular.
3. Place mixture in a pan with a sieve at the bottom or fine holes at its base.
3. Steam the mixture.
4. Dry and serve hot.

**Variations on preparation**
- Add finely chopped vegetables to the FBF/salt mixture before steaming it. This will increase the nutritional value of the product and also provide a variation in the taste.
- Add sugar to the mixture before steaming it, in order to make a sweet couscous.
- Add sugar and groundnut paste. Before serving, mix with milk, if available. (This variation is called *Muraake* in Senegal.)

**Local names**
*Couscous* in Niger, North Africa, Senegal
*Upma* in India

Suitable for all age groups over 1 year

# Papadum

**Ingredients**
2 parts FBF
1 teaspoon salt
Baking powder
Red chilli powder and
cumin seeds to taste
1 part warm water (pre-boiled)


**Method of preparation**
1. Mix together FBF, salt, baking powder, chilli powder and cumin seeds. Add water to make stiff dough.
2. Form into small balls and flatten with a rolling pin.
3. Dry the papadums in the shade.
4. Roast before serving.

The taste can be modified with the addition of garlic or black pepper. Papadums can be made in large quantity and stored for later use.

**Local names**
*Papad or Papdi* in India
*Papadums* in Latin America

Suitable for all age groups over 1 year

# Badiyan

**Ingredients**

2 parts FBF
1 teaspoon salt
Red chilli powder and cumin seeds, to taste
1 1/2 parts water

**Method of preparation**

1. Mix together FBF, salt, chilli powder and cumin seed. Add water to make a thick batter.
2. With fingers and thumb roll dough into small balls and place on a clean polythene sheet.
3. Leave to dry in the shade.
4. Store the balls for later use. Serve in gravy or soups, or boil in water and eat.

The taste can be modified with the addition of garlic or a variety of spices, such black pepper. The dough can be made in large quantities and stored a long time for later use.

**Local names**

*Badiyan* or *Mangodi* in India

## Suitable for all age groups over 1 year

WFP / J. Gamboa

# Vegetable Stew


## Ingredients

2 carrots, diced
2 potatoes, diced
2 glasses of water
4 tablespoons FBF
2 tablespoons oil
1 small onion, chopped
1 small tomato, chopped
Pinch of salt

## Method of preparation

1. Boil diced carrots and potatoes.
2. Remove cooked vegetables from water, saving the water.
3. Boil FBF in vegetable water for 10 minutes. Set aside.
4. Fry onion and tomato in oil.
5. Add cooked vegetables and boiled FBF to pan, add salt and cook for another 5 minutes.

**Local names**

*Guiso de vegetales* in Guatemala
*Namsae Pokum* in the Democratic People's Republic of Korea (with carrot and *minari* as the vegetables and a little sugar added)

Suitable for all age groups over 1 year

# Tomato Sauce

**Ingredients**

4 medium tomatoes, chopped
2 medium onions, chopped
1 pepper, chopped
2 tablespoons of oil
1 cup of water
2 cups FBF
Pinch of salt

**Method of preparation**

2. Fry vegetables in oil.
3. Dissolve FBF in water. Add FBF/water mixture to vegetables and simmer for 10 minutes.
4. Blend mixture and serve as a sauce.

**Local names**

*Salsa de tomate con harina enriquecida* in Guatemala

## Suitable for all age groups over 1 year

# 6. Processing Instructions and Product Specifications

## I FBF Processing Instructions

Fortified blended food should be manufactured from fresh ingredients of good quality and free from foreign materials, substances hazardous to health, excessive moisture, insect damage and fungal contamination. The ingredients should comply with all relevant national food laws and standards, and must be stored under dry, well ventilated and hygienic conditions. Only safe insecticides may be used for the ingredients' storage.

The production process should be in accordance with the "Code of Hygienic Practice for Foods for Infants and Children" and "Code of Sound Manufacturing Practices" of the Codex Alimentarius.

Fortified blended food is a mixture of the following ingredients:

- cereals such as maize, sorghum, millet, wheat or a combination, providing carbohydrates and protein;
- pulses (chickpeas) or soybeans, as an additional source of protein;
- oilseeds (groundnuts, hulled sunflower seeds, sesame) or soybean or stabilized vegetable oil, as an additional source of oil;
- vitamin/mineral supplements
- sugar, if required (up to 10 percent); replacing an equivalent amount of cereal.

Although other ingredients and combinations are possible, FBFs are manufactured according to the following general recipe:

| | |
|---|---|
| whole maize[1]: | 80 percent by weight |
| whole soybeans[2]: | 20 percent by weight |
| vitamin/mineral premix: | (as specified below) |

[1] Maize need not be husked.
[2] Soybeans need not be hulled.

FBFs should be manufactured using one of the following methods:

**Extrusion.** Cereals and pulses/oilseeds/soybeans are mixed in the correct amount, gritted and pre-cooked through extrusion (at a temperature not exceeding 160°C/320°F). The extruded product is immediately cooled to ambient temperature and milled into a fine flour. The flour is homogeneously mixed with the vitamin/mineral supplement and (if applicable) sugar and/or oil.

**Roasting/Milling.** Cereals and pulses/oilseeds/soybeans are roasted separately at a temperature not exceeding 180°C/350°F (recommended: cereals 10 minutes at 140°C; pulses/oilseeds/soybeans 15 minutes at 170°C). The roasted products are immediately cooled to ambient temperature, mixed in the correct amount and milled into a fine flour. The flour is then homogeneously mixed with the vitamin/mineral supplement and (if applicable) sugar and/or oil.

## Micronutrient fortification

FBFs should be fortified to the extent that to each metric ton of finished product, 1 kg Unimix vitamin pre-mix and 3 kg Unimix mineral pre-mix are added.
These pre-mixes must be obtained from qualified suppliers such as ROCHE, BASF, or their local authorized dealers. Proof of purchase of pre-mixes must be presented upon request.

| Micronutrient per 100 g finished product | | |
|---|---|---|
| Vitamin A | 1664 | I.U. |
| Thiamine | 0.128 | mg |
| Riboflavin | 0.448 | mg |
| Niacin | 4.8 | mg |
| Folate | 60 | mcg |
| Vitamin C | 48 | mg |
| Vitamin B12 | 1.2 | mcg |
| Iron++ | 8 | mg as Ferrous Fumarate |
| Calcium++ | 100 | mg as Calcium Carbonate |
| Zinc++ | 5 | mg as Zinc Sulphate |

## II FBF Product Specifications

1. Except when specified otherwise in the contract, FBFs should comply with the "Guidelines on Formulated Supplementary Foods for Older Infants and Young Children" of the Codex Alimentarius (Ed. July 1991).

2. FBFs are suitable as dietary supplements for older infants and young children, as well as for other vulnerable groups. They can be served as porridge or gruel or as extenders to other foods.

3. FBFs should meet the following requirements:

**Sensory qualities**. They should have a pleasant smell and pleasing taste that young children would enjoy.

**Shelf-life**. They should retain the above qualities for at least 6 months from their date of manufacture when stored dry at ambient temperatures prevalent in the beneficiary country.

**Flour characteristics**. FBF flour should have a uniform, fine texture, with the following particle distribution: 95 percent must pass through a 600-micrometer sieve; 100 percent must pass through a 1,000-micrometer sieve.

**Dispersion**. FBFs should not lump or ball when mixed with water of ambient temperature.

**Preparation and cooking time**. They should be ready for consumption by older infants as a thick gruel with the addition of 3 parts water of ambient temperature to 1 part FBF (parts by weight), when brought to a boil for five minutes.

**Moisture and crude fibre**. They should contain a moisture content not exceeding 10 percent and a fibre content (based on dry product) not exceeding 5 percent.

**Nutritional value**. They should contain not less than the following nutritional value per 100 g dry product: 400 kcal; 15 percent protein (Nx6.25); 6 percent fat; vitamin/mineral supplement according 1:6.

**Energy density**. When prepared as gruel, they should contain not less than 100 kcal/100 ml.

**Safety**. They should:

- be free from objectionable matter;
- not contain any substances originating from micro-organisms, or any other poisonous or deleterious substances such as anti-nutritional factors, heavy metals or pesticide residues, in amounts that may represent a hazard to health;
- have a permitted level of aflatoxin of 20 ppb;
- have an urease index between 0.05 and 0.2 pH units;
- not exceed the following level of microbiological contamination (maximum/gram finished product):
  - Mesophilic aerobic bacteria: 100,000
  - Coliforms: 100
  - Salmonellae (per 25-g sample): 0

4. The variation of the final product with respect to moisture, fibre, protein, fat and micronutrient content should not exceed plus or minus 5 percent of the original value using standard analytical techniques; products not meeting this requirement are liable for rejection.

WFP / South Africa

## III Packaging

The product should be packed in new, laminated woven polypropylene outerbags (minimum weight 80 g) with polyethylene innerbags (minimum thickness 75 micron or 300 gauge) of 25-kg contents. The innerbags should be heat sealed, the outerbags double stitched.

The markings required on the outerbags will be vary from country to country.

# 7. Nutritional Composition of Corn-soya Blend (CSB)

| | | |
|---|---|---|
| Contains: | 69.7% | processed, gelatinized, cornmeal |
| | 22.0% | defatted, toasted, soy flour |
| | 2.7% | mineral pre-mix |
| | 0.1% | vitamin, antioxidant pre-mix |
| | 5.5% | refined, deodorized, stabilized soy oil |

**Nutritive value per 100 g of CSB**

| | |
|---|---|
| Food energy (kcal) | 380 |
| Proteins (g) | 18 |
| Carbohydrates (g) | 60 |
| Fat (g) | 6 |

**Vitamins:**

| | |
|---|---|
| Vitamin A (I.U.) | 1700 |
| Vitamin D (I.U.) | 200 |
| Vitamin E (I.U.) | 8 |
| Thiamin (mg) | 0.7 |
| Riboflavin (mg) | 0.5 |
| Niacin (mg) | 8 |
| Vitamin B6 (mg) | 0.7 |
| Vitamin B12 (mcg) | 4 |
| Pantothenic acid (mg) | 3 |
| Folacin (mg) | 0.2 |
| Ascorbic acid (mg) | 40 |

**Minerals:**

| | |
|---|---|
| Calcium (mg) | 800 |
| Phosphorous (mg) | 600 |
| Magnesium (mg) | 100 |
| Iron (mg) | 18 |
| Zinc (mg) | 3 |
| Sodium (mg) | 300 |
| Potassium (mg) | 700 |
| Iodine (mcg) | 50 |

**Protein Evaluation**

**PER (Protein Efficiency Ratio)**

| **CSB** | **Milk (casein)** |
|---|---|
| 2.3 | 2.5 |

| Essential Amino Acid Evaluation* | CSB | FAO/WHO Suggested level** |
|---|---|---|
| Isoleucine | 42 | 40 |
| Leucine | 98 | 70 |
| Lysine | 45 | 55 |
| Methionine+ Cystine | 26 | 35 |
| Phenylalanine+ Tyrosine | 78 | 60 |
| Threonine | 37 | 40 |
| Tryptophan | 8 | 10 |
| Valine | 46 | 50 |

* Expressed as milligrams of amino acid per gram of protein.

** From: "Energy and Protein Requirements: Report of a Joint FAO/WHO Ad Hoc Expert Committee", Rome 1973.

**Reference: North American Millers Association, 600 Maryland Avenue. SW, Suite 305W, Washington, D.C. 20024-2520.**

# 8. Nutritional Composition of Wheat-soya Blend (WSB)

| Contains: | | |
|---|---|---|
| | 73.1% | precooked wheat |
| | 20.0% | soy flour |
| | 2.9% | vitamin and mineral pre-mix |
| | 4.0% | stabilized salad oil |

**Nutritive value per 100 g of WSB**

| | |
|---|---|
| Food energy (kcal) | 360 |
| Proteins (g) | 20 |
| Carbohydrates (g) | 60 |
| Fat (g) | 6 |

**Vitamins**:

| | |
|---|---|
| Vitamin A (I.U.) | 1 658 |
| Vitamin D (I.U.) | 200 |
| Vitamin E (I.U.) | 9.6 |
| Thiamin (mg) | 1.49 |
| Riboflavin (mg) | 0.59 |
| Niacin (mg) | 9.1 |
| Vitamin B 6 (mg) | 0.52 |
| Vitamin B 12 (mcg) | 4 |
| Pantothenic acid (mg) | 3.7 |
| Folacin (mg) | 0.33 |
| Ascorbic acid (mg) | 40 |

**Minerals:**

| | |
|---|---|
| Calcium (mg) | 749 |
| Phosphorous (mg) | 562 |
| Magnesium (mg) | 202 |
| Iron (mg) | 20.8 |
| Zinc (mg) | 4.6 |
| Sodium (mg) | 296 |
| Potassium (mg) | 624 |
| Iodine (mcg) | 50 |

**Essential Amino Acid Evaluation***

| | WSB | FAO/WHO Suggested level** |
|---|---|---|
| Isoleucine | 48 | 40 |
| Leucine | 81 | 70 |
| Lysine | 53 | 55 |
| Methionine + Cystine | 44 | 35 |
| Phenylalanine + Tyrosine | 91 | 60 |
| Threonine | 38 | 40 |
| Tryptophan | 17 | 10 |
| Valine | 55 | 50 |

**Protein Evaluation**
**PER (Protein Efficiency Ratio)**

| **WSB** | **Milk (casein)** |
|---|---|
| 2.4 | 2.5 |

* Expressed as milligrams of amino acid per gram of protein.

** From: "Energy and Protein Requirements: Report of a Joint FAO/WHO Ad Hoc Expert Committee", Rome 1973.

**Reference: North American Millers Association, 600 Maryland Avenue. SW, Suite 305W, Washington, D.C. 20024-2520.**

# 9. WFP Support for Production of Blended Food Equipment

Low-cost fortified blended foods were originally developed in the United States of America during the 1960s. Initially milk powder was used as the complementary source of protein. For economic reasons, soybeans are now used. Corn-soya blend and wheat-soya blend are the best known examples of fortified blended foods. The bulk of the fortified blended foods distributed by WFP are in-kind donations consisting of these products (about 100,000 mt out of a total of 160,000 mt).


Recently, in other industrialized countries (Belgium, Denmark, the Netherlands) manufacturing capacity for low-cost fortified blended foods has been developed, with WFP providing technical guidance.

Furthermore, in the last decade, WFP, together with UNHCR and UNICEF, gave technical and/or financial assistance to potential FBF suppliers in developing countries in order to establish a competitive, quality and cost-effective FBF production capacity. The assistance varied from technical advice on processing methods to pre-financing of appropriate production equipment.

Currently, WFP is purchasing low-cost FBFs, including Unilito in Nepal, Unimix in Kenya, and Indiamix in India.

In cooperation with private equipment manufacturers, WFP has developed sets of blended food processing equipment suited for particular conditions in the Democratic People's Republic of Korea, Eritrea, Ethiopia, India, Kenya, Madagascar, Malawi, Nepal, Nicaragua and Senegal. The producers in Malawi, Nepal and Senegal were assisted financially to purchase roasting equipment.

The Indiamix support model is a good example of the private sector receiving technical/financial support to establish viable, competitive FBF capacity.

For further information on equipment and technical advice, please contact the Nutrition Unit.

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